

**CLAIMS:**

1           1. A method of effectively extracting a clock signal  
2 from a data stream, comprising the steps of:  
3           generating a plurality of multiphase clock signals;  
4           selecting one of the multiphase signals based on a  
5 plurality of synchronization states identifying which of the  
6 multiphase clock signals is most closely aligned with the  
7 data stream; and  
8           sampling the data stream using the selected one of the  
9 multiphase signals to produce a retimed data signal.

10           2. The method of Claim 1 wherein said generating step  
11 generates multiphase clock signals which are subharmonics of  
12 the data stream.

13           3. The method of Claim 1 wherein said selecting step  
14 includes the step of determining whether the multiphase  
15 clock signals are either early or late with respect to the  
16 data stream.

17           4. The method of Claim 3 wherein said determining step  
18 includes the further step of sampling the multiphase clock  
19 signals using a plurality of D-type flip-flops.

20           5. The method of Claim 1 wherein:  
21           each of the multiphase clock signals has at least one  
22 rising edge; and  
23           said selecting step includes the step of using the  
24 synchronization states to define which of the rising edges  
25 of the multiphase clock signals is most closely aligned with  
26 an edge of the data stream.  
27

1           6. The method of Claim 1 wherein said generating step  
2 generates the multiphase clock signals using a multiphase  
3 voltage-controlled oscillator.

1           7. The method of Claim 6 further comprising the steps  
2 of:  
3           creating an error signal using the multiphase clock  
4 signals and the data stream;  
5           applying the error signal to a charge pump; and  
6           correcting the multiphase clock signals using a control  
7 voltage output of the charge pump.

1           8. The method of Claim 1 wherein said selecting step  
2 includes the step of using the synchronization states to  
3 define a plurality of retimed state signals.

1           9. The method of Claim 8 wherein said sampling step  
2 further comprises the steps of:  
3           inverting the multiphase clock signals to produce  
4 inverted phase signals;  
5           combining respective pairs of the retimed state signals  
6 and the inverted phase signals using a plurality of  
7 respective AND gates;  
8           combining the outputs of the AND gates using an OR  
9 gate; and  
10          latching the output of the OR gate using the data  
11 stream to produce the retimed data signal.

1           10. A circuit for effectively extracting a clock signal  
2 from a data stream, comprising:

3           means for generating a plurality of multiphase clock  
4 signals;

5           means for selecting one of the multiphase signals based  
6 on a plurality of synchronization states identifying which  
7 of the multiphase clock signals is most closely aligned with  
8 the data stream; and

9           means for sampling the data stream using the selected  
10 one of the multiphase signals to produce a retimed data  
11 signal.

12           11. The circuit of Claim 10 wherein said generating  
13 means generates multiphase clock signals which are  
14 subharmonics of the data stream.

15           12. The circuit of Claim 10 wherein said selecting  
16 means includes means for determining whether the multiphase  
17 clock signals are either early or late with respect to the  
18 data stream.

19           13. The circuit of Claim 12 wherein said determining  
20 means samples the multiphase clock signals using a plurality  
21 of D-type flip-flops.

22           14. The circuit of Claim 10 wherein:  
23           each of the multiphase clock signals has at least one  
24 rising edge; and  
25           said selecting means uses the synchronization states to  
26 define which of the rising edges of the multiphase clock  
27 signals is most closely aligned with an edge of the data  
28 stream.

1           15. The circuit of Claim 10 wherein said generating  
2 means includes a multiphase voltage-controlled oscillator.

1           16. The circuit of Claim 15 further comprising:  
2 means for creating an error signal using the multiphase  
3 clock signals and the data stream; and  
4 a charge pump receiving the error signal as an input,  
5 and providing a control voltage output to said voltage-  
6 controlled oscillator.

1           17. The circuit of Claim 10 wherein said selecting  
2 means uses the synchronization states to define a plurality  
3 of retimed state signals.

1           18. The circuit of Claim 17 wherein said sampling  
2 means:

3           inverts the multiphase clock signals to produce  
4 inverted phase signals;

5           combines respective pairs of the retimed state signals  
6 and the inverted phase signals using a plurality of  
7 respective AND gates;

8           further combines outputs of said AND gates using an OR  
9 gate; and

10          latches an output of said OR gate using the data stream  
11 to produce the retimed data signal.